REMARKS

I. INTRODUCTION

Claims 11 and 14 have been amended to clarify the exemplary claimed embodiment of the present application recited therein. Claims 15-20 have been previously withdrawn as being directed to non-elected subject matter. New claim 21 has been added. Accordingly, claims 11-14 and 21 are under consideration in the above-referenced application. Provided above, please find a claim listing indicating the current amendments to claims 11 and 14, and the addition of new claim 21. In addition, the Substitute Specification has been amended above. Applicants respectfully assert that the amendments to claims 11 and 14, the addition of new claim 14, and the modifications to the Substitute Specification fully comply with the requirements set forth in 37 C.F.R. § 1.121. Support for the claim amendment and new claim 21 can be found in, e.g., the original specification and claims. (See, e.g., substitute specification, paras. [0011], [0040] and [0051], and claim 15). It is respectfully submitted that no new matter has been added.

II. OBJECTIONS TO CLAIM 14 AND SPECIFICATION SHOULD BE WITHDRAWN

Claim 14 stands objected to due to minor informalities. In particular, the Examiner pointed out his belief that the recited term "port" should be amended to be "portion." As the Examiner shall ascertain, claim 14 has been amended above to replace the term "port" with the term "portion" as suggested by the Examiner. Accordingly, the objection to claim 14 is now moot, and should therefore be withdrawn.

The Examiner also objected to the specification under 35 U.S.C. § 132 as allegedly introducing new matter in the application. In the Office Action, the Examiner contends that the modification of the terms "required" and "required" to the term "preferable" is not supported by

the original disclosure. Applicants respectfully disagree that such linguistic changes impact the enablement of the subject matter recited in the claims of the present application. Indeed, since the original PCT application was filed in Japanese, these changes to the specification of the application have been made to provide the specification in a form pursuant to U.S. patent rules and practice, and not for any reason relating to the scope and enablement of the claimed subject matter. However, to expedite the prosecution of the present application, paragraphs [0040], [0041], [0044] and [0072] of the Substitute Specification have been amended above to revert the language pointed to by the Examiner to the originally-provided terms as set forth in the English-language translation of these paragraphs from the underlying PCT application. Accordingly, the objection to the specification under 35 U.S.C. § 132 is now moot, and should therefore be withdrawn.

III. REJECTION UNDER 35 U.S.C. § 112, ¶1 SHOULD BE WITHDRAWN

Claims 11-14 stand rejected under 35 U.S.C. § 112, first paragraph as allegedly being non-enabling. The Examiner believes that because originally-filed independent claim 14 does not state that the hard phase is comprised of martensite or bainite, this claim is allegedly not enabled for any hard phase. (See Office Action, p. 3, para. 10). As the Examiner shall ascertain, independent claim 11 has been amended above to recite a "hard second phase of martensite." Accordingly, the rejection under 35 U.S.C. § 112, first paragraph is now moot, and should therefore be withdrawn.

IV. REJECTIONS UNDER 35 U.S.C. §§ 102(b) AND 103(a) SHOULD BE WITHDRAWN

Claims 11 and 12 stand rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by U.S. Patent Publication No. 2002/0179193 (the "'193 Publication"). Claims 11-14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the '193 Publication. Claims 13 and 14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Japanese Publication No. 2002-180193 (the "Japanese Publication"). Claim 12 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over the Japanese Publication, in view of the '193 Publication. For at least the reasons set forth herein below, Applicants respectfully assert that amended independent claim 11 are not rendered obvious or anticipated by the '193 Publication, or rendered obvious by the Japanese Application.

In order for a claim to be rejected as anticipated under 35 U.S.C. § 102, each and every element as set forth in the claim must be found, either expressly or inherently described, in a single prior art reference. Manual of Patent Examining Procedures, §2131; *also see Lindeman Machinenfabrik v. Am Hoist and Derrick*, 730 F.2d 1452, 1458 (Fed. Cir. 1984).

In order for a claim to be rejected for obviousness under 35 U.S.C. § 103, not only must the prior art teach or suggest each element of the claim, the prior art must also suggest combining the elements in the manner contemplated by the claim. *See KSR International Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1731 (2007); *Takeda Chemical Industries, Ltd. v. Alphapharm PTY, Ltd.*, No. 06-1329, 2007 WL 1839698, *5 (June 28, 2007 Fed.Cir.). "It is improper to use the inventor's disclosure as a road map for selecting and combining prior art disclosures." *See Grain Processing Corp. v. American Maize-Products Corp.*, 840 F.2d 902, 907 (Fed. Cir. 1988). "[T]he reference must be viewed without the benefit of hindsight afforded to the disclosure." *In re Paulsen*, 30 F.3d 1475, 1482 (Fed. Cir. 1994). The teaching or suggestion to make the

claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicants' disclosure. *See In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991).

The '193 Publication relates to a compound structure steel sheet excellent in fatigue resistance and burring workability (hole expansibility) and having a tensile strength of 540 MPa or more. (See '193 Publication, paras. [0001] and [0011]). Steel sheets having polygonal ferrite and retained austenite are also described in the '193 Publication.

The Japanese Publication relates to a hot-rolled steel sheet having superior flange elongation and tensile strength of 400 to 490Mpa. (See Japanese Publication, para. [0009]). The hot-rolled steel sheet of the Japanese Publication includes 85% or more of polygonal ferrite, and the remainder of bainite and/or membrane-like cementite. In addition, this publication describes that the hot-rolled steel sheet is coiled at a temperature of 400 to 600°C. (See *id.*, claim 3). In the examples, the Japanese Publication further describes that steel sheet No. 10 consists of polygonal ferrite and martensite, with a tensile strength (TS) is 571 MPa, and steel sheet No. 10 as a comparative example which shows that the tensile strength of a steel sheet including martensite as a second a phase would becomes over 490Mpa. Thus, martensite as a second phase would not be preferable to realize the steel sheet having a tensile strength of not more than 490MPa.

Applicants' invention, as recited in amended independent claim 11, relates to hot-rolled steel sheet for processing and having a superior bake hardenability after aging which comprises the following features:

(A) at least one portion which comprises, in terms of percent by mass, C of approximately 0.01% to 0.2%, Si of approximately 0.01 to 0.3%, Mn of at most approximately (1.5 - Si) %, P of at most approximately 0.1%, S of at most approximately 0.03%, Al of approximately 0.001% to 0.1%, N of at most approximately 0.006%, and a remainder of Fe and unavoidable impurities,

(B) a microstructure which consists essentially of a main phase having a form of a polygonal ferrite and a hard second phase of martensite

(C) a volume fraction of the hard second phase is approximately 3% to 20%, a hardness ratio of a hardness of the hard second phase to a hardness of the polygonal ferrite is about 1.5 to 6, and a grain size ratio of a grain size of the polygonal ferrite to a grain size of the hard second phase is at least approximately 1.5,

(D) a BH amount after aging is at least approximately 60 Mpa, and

(E) the hot-rolled steel sheet is manufactured by rough-rolling a slab to obtain a rough rolled bar, the slab including, in terms of percent by mass, C of approximately 0.01% to 0.2%, Si of approximately 0.01 to 0.3%, Mn of at most approximately (1.5 - Si) %, P of at most approximately 0.1%, S of at most approximately 0.03%, Al of approximately 0.001% to 0.1%, N of at most approximately 0.006%, and a remainder of Fe and unavoidable impurities; finish rolling the rough rolled bar to obtain a rolled steel under conditions in which a sum of reduction rates of a final stage and a stage prior to the final stage is at least approximately 25%, a reduction rate of the final stage is about 1% to 15%, and a finishing temperature is in a temperature range from an approximately Ar_3 transformation point temperature to an Ar_3 transformation point temperature + 100°C; maintaining the rolled steel in a temperature range from approximately below the Ar_3 transformation point temperature to at least the Ar_1 transformation temperature for approximately 1 second to 15 seconds; cooling the rolled steel to a temperature of approximately 350°C at a cooling rate of approximately at least 100°C/sec to obtain the hot-rolled steel sheet; and coiling the hot-rolled steel sheet at a temperature of below approximately 350°C.

EXEMPLARY BENEFITS AND PROCEDURES USING CLAIMED SUBJECT MATTER

Provided below is a description of exemplary non-limiting benefits and possible non-limiting procedures which can be implemented using the steel sheet recited in amended independent claim 11.

For example, with respect to the recited feature (A) of amended independent claim 11, in terms of percent by mass, Mn is at most approximately (1.5 - Si) %. Thus, due to such recited feature, it is possible that the tensile strength of the hot rolled steel sheet can be between

approximately 370 Mpa to 490 Mpa, as recited in new claim 21. This can be seen in Table 3 of Examples provided in the Substitute Specification illustrating that, e.g., when the Mn content satisfies Mn ≤ (1.5 - Si) %, the tensile strength (TS) may be 490MPa or less.

Turning to the recited feature (B), according to one exemplary embodiment of the present invention, the hot-rolled steel sheet can be a Dual Phase steel which can consist essentially of a main phase having a form of a polygonal ferrite and a hard second phase of martensite. For example, since martensite generally has a greater volumetric expansion and may allows the introduction of a larger number of mobile dislocations than bainite, the yield point can be further lowered and the BH amount can be increased. (See, e.g., Substitute Specification, para. [0040]).

Regarding the recited feature (C), an exemplary embodiment of the hot-rolled steel sheet may be provided, in which sufficient mobile dislocations remain likely has a sufficient BH amount even in the case in which the hot-rolled steel sheet is subjected to processing and baking after aging proceeds spontaneously.

Such exemplary mechanism, in comparison which conventional steel sheets can be as follows:

In the hot-rolled steel sheet according to an exemplary embodiment of the present invention in which sufficient mobile dislocations generally remain, a sufficient amount of mobile dislocations which have been introduced during hot-rolling remain in the interior of the steel even after aging likely proceeds spontaneously. As a result, e.g., since during processing after the spontaneous aging, a sufficient amount of mobile dislocations likely still remains, yield generally occurs in a low strain region; thereby, the hot-rolled steel sheet which can be easily processed is realized. Furthermore, after baking following the processing, an increase amount of yield point ((yield point after processing and baking) – (yield point before processing)) can

become large; thereby, strength can be obtained which is equivalent to that of a pressed product manufactured, e.g., likely by applying a 540 MPa-class steel sheet.

On the other hand, for the conventional steel sheets, after spontaneous aging, most of mobile dislocations which have been introduced during the manufacturing process are fixed by solute carbon, or fixed in a Cottrell atmosphere. As a result, since mobile dislocations are likely not present during subsequent processing, the yield point is increased, and the processability generally deteriorates. In addition, by introducing a strain, the fixed dislocations come away; thereby, a yield elongation occurs and the surface texture after pressing becomes worse.

Accordingly, with regard to the exemplary embodiment of the hot-rolled steel sheet described in the present application, the spontaneous aging is generally not a concern. For example, in the case in which coil shaped steel sheets are transported in a hot area such as tropical area, age-hardening can occur in the conventional steel sheets, and subjecting the conventional steel to pressing is less possible. In contrast, the exemplary embodiment of the steel sheets described in the present application can easy be subjected to pressing even after being transported in a hot area, and after pressing, pressed products having sufficient strength can be obtained.

For example, the bake hardenability after spontaneous aging can be evaluated in accordance with the following exemplary procedure. Test pieces are subjected to an aging treatment, and then preliminary tensile strain is applied to the test pieces, and thereafter the test pieces are subjected to heat treatment equivalent to a baking finish treatment, after which the tensile test is carried out again, and an increased amount of a portion corresponding to the yield point ((yield point after processing and baking) – (yield point before processing)) is measured. (See, e.g., Substitute Specification, para. [0029]). This exemplary aging treatment corresponds

to, for example, the spontaneous aging which occurs when coil shaped steel sheets are transported in a hot area such as tropical area.

Thus, using claimed feature (C), e.g., both processability and superior bake hardenability after aging can be realized. (See *id.*, e.g., paras. [0040]-[0044]).

Concerning recited feature (E), e.g., a grain size ratio of grain size of the polygonal ferrite to grain size of the hard second phase becomes 2.5 or more by conducting finish rolling under the above conditions. (See *id.*, e.g., para. [0072]). In addition, an incrassation of carbon can be promoted and mobile dislocations are generally introduced. Furthermore, by maintaining the rolled steel in an above-described temperature range, a phase separation of the ferrite phase and austenite phase can proceed. (See *id.*, e.g., para. [0077]). Further, e.g., by cooling the rolled steel to a temperature of approximately 350°C at a cooling rate of approximately at least 100°C/sec and coiling the hot-rolled steel sheet at a temperature of below approximately 350°C, a second phase of sufficient hardness can be obtained. (See *id.*, e.g., para. [0078]). With regard to austenite, e.g., a martensite transformation can proceed, and volume expansivity can occur; thereby, polygonal ferrite is subjected to compression deformation, and mobile dislocations are likely introduced into polygonal ferrite. Since a plurality of mobile dislocations are introduced into polygonal ferrite, a superior bake hardenability after aging can be obtained.

As described above, with reference to the recited feature (D), a BH amount after aging of at least approximately 60 MPa can be obtained.

DISTINCTIONS BETWEEN CLAIMED SUBJECT MATTER AND CITED REFERENCES

i. '193 PUBLICATION

Turning to the recitation of amended independent claim 11, the '193 Publication describes, as examples, the steel sheets satisfying Si + Mn ≤ 1.5%, steels E and F in Table 1 and steels C and D in Table 3 of the '193 Publication are disclosed. However, hot-rolled steel sheets manufactured using these steels (steels E and F in Table 2 and No. 11 and 12 in Table 4 of the '193 Publication) are manufactured under conditions in ***which a cooling rate is 90 ℃/s and is less than 100 ℃/s***. In contrast, as provided above with reference to recited feature (E), amended independent claim 11 provides that ***a cooling rate is at least 100 ℃/s***. Accordingly, the '193 Publication lacks the recited subject matter of claimed feature (E) as provided in amended independent claim 11.

In addition, the microstructures of the '193 Publication include bainite, and thus fail to disclose the subject matter provided in claimed feature (B) of amended independent claim 11. Furthermore, the '193 Publication does not disclose **that a BH amount after aging is at least approximately 60 Mpa** (i.e., recited feature (D) of amended independent claim 11). Furthermore, with respect to new claim 21, the tensile strengths (σB) of the steel sheets described in the '193 Publication are more than 490MPa, and thus different from the hot-rolled steel sheet recited in this claim, providing that **the steel sheet has a tensile strength of 370 to 490 MPa**.

Accordingly, for at least the reasons as set forth herein above, the '193 Publication fails to disclose, teach or suggest the subject matter recited in amended independent claim 11. Claims 12-14 and 21 which depend from amended independent claim 11 are believed to be allowable over the '193 Publication for at least the same reasons. With reference to new claim 21, this

claim also includes additional subject matter which is not disclosed, taught or suggested by the '193 Publications for the additional reasons described above.

ii. JAPANESE PUBLICATION

As discussed above, the Japanese Publication describes a hot-rolled steel sheet which includes 85% or more of polygonal ferrite, and the remainder of bainite and/or membrane-like cementite. However, the Japanese Publication fails to teach, suggest or disclose a microstructure that "**consists essentially of ... a hard second phase of martensite**," as recited in amended independent claim 11 (i.e., the claimed feature (B)).

Further, as described in the Japanese Publication, the hot-rolled steel sheet is coiled at a temperature of 400 to 600°C. In contrast, claimed feature (E) provides coiling the hot-rolled steel sheet at ***a temperature of below approximately 350°C***, as also recited in amended independent claim 11. In Examples of the Japanese Publication, steel sheet No. 10 is described which consists of polygonal ferrite and martensite. However, the tensile strength (TS) of such steel sheet is 571 MPa, and steel sheet No. 10 is provided as a comparative example which shows that the tensile strength of a steel sheet including martensite as a second a phase would becomes over 490Mpa. Therefore, according to the Japanese Publication, it would not be beneficial to use martensite as a second phase to obtain the steel sheet having a tensile strength of not more than 490MPa. Accordingly, a person skilled in the art would not realize the hot-rolled steel sheet of the present invention consisting essentially of polygonal ferrite and martensite by reviewing the teachings of the Japanese Publication.

Accordingly, for at least the reasons as set forth herein above, the Japanese Publication fails to disclose, teach or suggest the subject matter recited in amended independent claim 11.

Claims 12-14 and 21 which depend from amended independent claim 14 are believed to be allowable over the '193 Publication for at least the same reasons.

iii. COMBINATION OF '193 PUBLICATION AND JAPANESE PUBLICATION

Even if, *arguendo*, the '193 Publication and the Japanese Publication are combinable, the alleged combination of these publication would still not teach or suggest the subject matter recited in amended independent claim 11 and claims 12-14 and 21 which depend from independent claim 11. (See, e.g., claimed features (B), (D) and (E)).

iv. WITHDRAWAL OF §§ 102(b) AND 103(a) REJECTIONS

Applicants respectfully assert that the 35 U.S.C. §§ 102(b) and 103(a) rejections should be withdrawn, and respectfully request that a confirmation be provided that pending claims 11-14 and 21 are allowable.

V. CONCLUSION

In view of the above, it is respectfully submitted that pending claims 11-14 and 21 are in condition for allowance. Prompt consideration, reconsideration and allowance of the present application are therefore earnestly solicited.

Respectfully submitted,

Dated: January 9, 2008

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